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STUDY PROJECT

THE CHEMICAL CORPS IN TRANSITION
--
VISIONING FOR THE FUTUPE

BY

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United States Army

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It is 1991, and just like the late 1970's, the United States Army Chemical Corps is in the midst of a transition--one that will determine the viability of the Corps in the future. In the late 70's and the 80's, the Chemical Corps based its primary operational missions on the Soviet nuclear, biological and chemical threat. That threat is now diminishing and a new threat is emerging--the third world. There are many hard questions that have to be asked, difficult decisions to be made and some innovative visioning that has to take place if the Chemical Corps is to continue as a branch of the Army. This case study looks at the current and future threat, develops ideas for new missions, and provides concepts for near term priorities and long term vision. The conclusions are that the Chemical Corps should not face the future as a single mission, single role branch of the Army, rather--(1) the Corps requires multi-skilled soldiers whose skills can be applied across the operational continuum, (2) the Corps should take the lead in technology, developing multi-purpose units, systems and equipment to counter conventional threats and defend against nuclear, biological and chemical threats.

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THE CHEMICAL CORPS IN TRANSITION
Visioning for the Future

AN INDIVIDUAL STUDY PROJECT

by

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ABSTRACT

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THE CHEMICAL CORPS IN TRANSITION
Visioning for the Future

A Year of Uncertainty - 1990

For those of us in the Chemical Corps, 1990 was a year of unprecedented uncertainty. The year began with projected base closings (most particularly the home of the Chemical Corps -- Fort McClellan, Al) and the imminent possibility of a bilateral chemical weapons destruction agreement with the Soviet Union. By late spring, proposals surfaced to combine the Chemical Corps with another branch and to reduce Chemical Corps infrastructure in combat units. Many in the Chemical Corps thought it was only a matter of time before 1973 was repeated all over again. Many noncommissioned and commissioned officers thought about looking for new MOSs and basic branches. An unkind, but common phrase in certain circles -- "NBC stands for NoBody Cares" -- appeared to be coming true.

But, by year's end, the Army was deeply involved in Desert Shield, facing an adversary who had recently used chemical weapons -- and some would say, with reckless abandon. Just as in the late 1970's, a renewed interest developed in the art and science of nuclear, biological and chemical warfare.

Evaluating the Threat

In reality, the threat posed by nuclear, biological and chemical (NBC) warfare has not, and will not, change. The use of NBC weapons on the battlefield has and will cause casualties, degrade force effectiveness, slow the operational tempo and compartmentalize the battlefield. The most profound way to protect our forces from NBC weapons is a global, verifiable ban. Such a ban does not exist, and such a ban will probably not exist in the future. Without a ban the next best way is to ensure that threat forces cannot gain an advantage by using NBC weapons.

To do that -- to paint a picture of the battlefield -- you must know who has, and who will have, the capability to employ NBC weapons.

The Soviet Union

For years the United States has maintained one of the world's largest arsenals of nuclear weapons and toxic chemical munitions as a deterrent against a known Soviet capability. The United States has told the world that maintenance of these stockpiles, and the threat to retaliate-in- kind if chemical or nuclear weapons were ever used against us, has kept these weapons of mass destruction off the modern battlefield.

America's consistency of purpose regarding these weapons has led, in part, to the success of our grand strategy of containment of the Soviet Union. This consistency of purpose, coupled with improving relations between the United States and the Soviet Union and potential arms control agreements, has dramatically reduced the Soviet threat. Conventional forces and equipment are being withdrawn from eastern Europe and the United States and the Soviet Union have agreed to unthought of reductions in theater nuclear forces and chemical munitions. Intermediate range nuclear missiles are a thing of the past and short range nuclear forces are on the agenda for elimination from Europe. Prospects are fair for substantial strategic nuclear force reductions. President Bush and President Gorbachev signed an agreement on June 1, 1990, calling for the destruction of the vast bulk of the United States and Soviet declared chemical weapons stockpiles by 2002.

But these recent positive developments must not overshadow a very basic fact -- even after these agreements, the Soviet Union will still have the most extensive conventional, nuclear, biological and chemical warfare capability in the world. Let there be no doubt the Soviet Union has and will continue to modernize these systems through extensive research and development programs.

Developing Nations

Today, no region in the developing world is free from some form of civil or national struggle. There can be no doubt that the proliferation of weapons in these regions is a major challenge to world peace. The danger is all too real that developing states will feel compelled to reach for ever broadening inventories of weapons responsive to a wide variety of escalation requirements. It is very possible that conventional, nuclear, biological and chemical weapons proliferation will become institutionalized in the third world, under highly volatile conditions. Today alone, over 29 countries have 1,000 or more modern tanks. Fourteen of these countries have 3,000 or more tanks. At least 13 countries have, or are on the verge of having, nuclear weapons. At least seven countries possess the ability to produce biological warfare agents. Over 22 countries have or are suspected of having a chemical weapons capability (see figure 4).[1]

Conventional Weapons

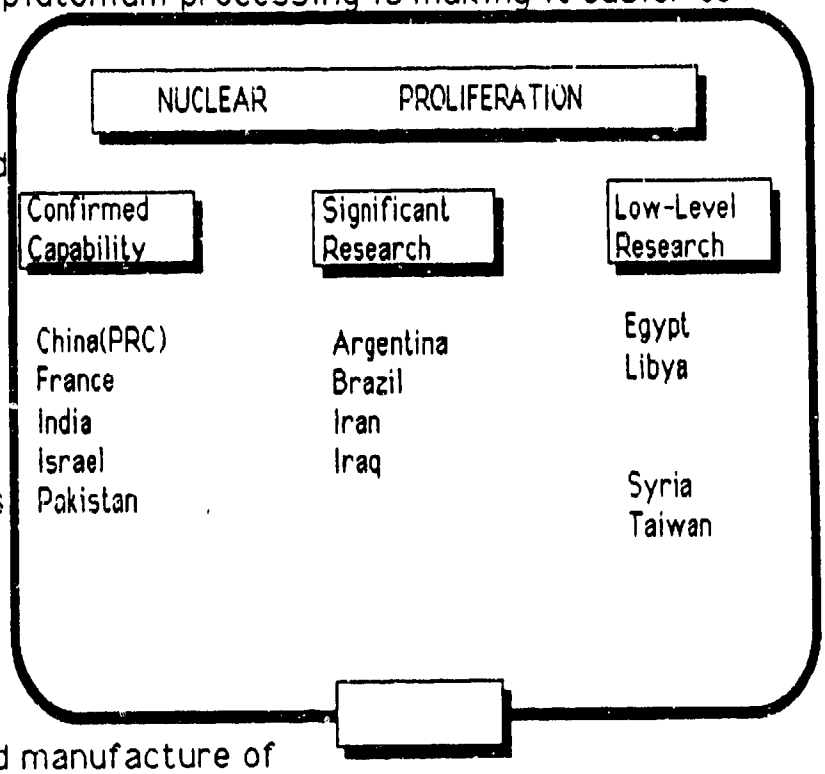
In the near term, conventional weapons are the primary threat to regional and world stability. A great deal of American literature regarding countries other than the Soviet Union still refers to combat in or with these countries as "low intensity conflict". I think "low intensity conflict" with and within the third world is a misnomer. It is extremely difficult to

see how we can treat the prospect of engaging a developing state with hundreds of advanced aircraft and other modern weapons as "low intensity." The plain truth is that the arms race in the developing world has reach the level where as much devastation can be generated as in any "high intensity conflict".

Reasons for this quantum increase in the operational tempo of warfare are numerous, but the primary cause is radical changes in the basic character of conventional arms transfer. Developing countries no longer accept equipment without the additional transfer of technology and production capability. With these tools nations can now develop their own more lethal conventional arms. In the past ten years developing nations have been able to buy advanced delivery systems for conventional weapons. Of particular concern are surface-to-surface missiles. Surface-to-surface missiles now in the inventories of developing states generally lack the accuracy and advanced warheads to have any major military effect. However, through technology transfer these countries are quickly developing the ability to produce longer-range missiles with increased lethality, to include weapons of mass destruction. On the horizon for these countries is the acquisition or production of "smart" or highly lethal conventional weapons, modernized cruise missiles, fuel-air explosive weapons, "smart" mines, more lethal anti-ship weapons, and advanced weapons of mass destruction.[2]

Nuclear Weapons

Nuclear weapons are on the threshold of reality for many third world nations. Recent progress in plutonium processing is making it easier to develop these weapons. Laser isotope separation and centrifuge methods of enrichment are becoming far more practical to obtain. There are strong indications that some of these third world nations are now fully familiar with the design and manufacture of enhanced radiation weapons, enhanced-yield fission weapons, and thermonuclear or fusion weapons (figure 1).[3] The probability of nuclear weapons being used in any future conflict with or within the third world increases daily.



The major problem for developing nations is that nuclear acquisition is far more costly and difficult than the acquisition of biological or chemical weapons.

Biological Weapons

Today's developing nations have available the science and technology for developing sophisticated biological warfare programs - programs that many have sought (figure 2).[4] They face no difficulty in obtaining on the open market the biological cultures needed to produce the most commonly weaponized infectious agents - anthrax, cholera, plague, Q fever, and tularemia. These agents can be tailor-made for warfare based on their lethality, treatability and transmissibility. For example anthrax, cholera and plague are highly lethal bacterial agents that can be spread easily. However, they can be treated with antibiotics and prevented by immunizations. Viral agents such as smallpox, however, do not respond to antibiotic treatments (figure 3).

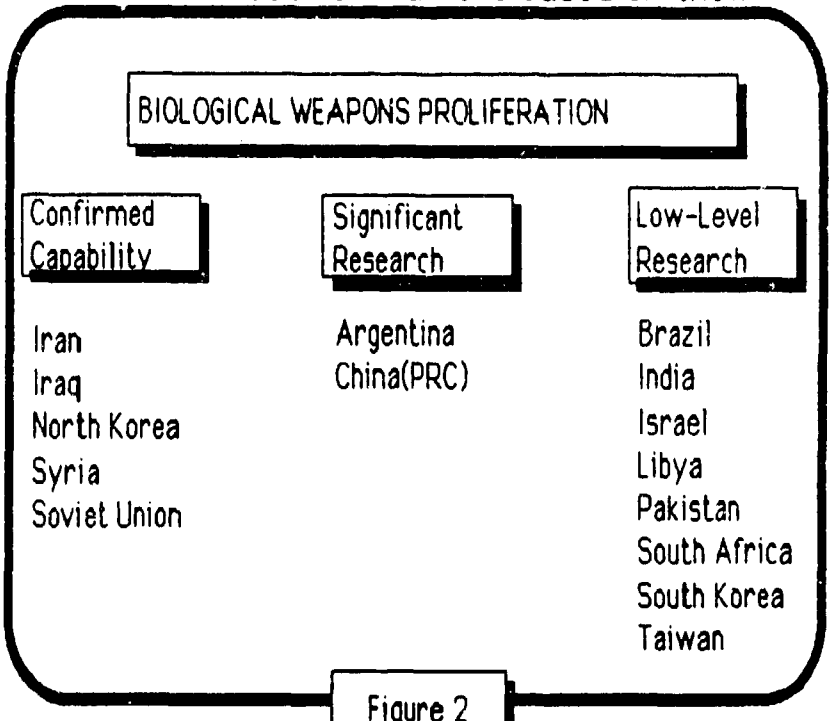


Figure 2

Toxins such as botulinum toxins, ricin, and tetrodotoxin are also easy to obtain (figure 3). What makes them so desirable is that they are nonliving (ie., can be produced synthetically in the laboratory) and are non-

transmissible.[5] Even more disturbing is that another process -- recombinant DNA -- means toxins can be manufactured quickly and spliced into an organism that is introduced into human targets through food, water or even air, where-upon it proceeds to manufacture the toxin inside the body.[6]

For developing nations the art and science of biological warfare is just around the corner. Soon they will be able to produce psychotoxins, neurotransmitters neuropeptides, etc.[7]

POTENTIAL BIOLOGICAL WARFARE DISEASES AND TOXINS

Diseases

Bacterial	
Anthrax	Lethal, Transmissible
Cholera	Lethal, Transmissible
Plague	Lethal, Transmissible
Tularemia	Non-lethal, Non-transmissible
Typhoid Fever	Non-lethal, Transmissible
Rickettsial	
Q-Fever	Non-lethal, Non-transmissible
Rocky Mtn Spotted Fever	Non-lethal, Non-transmissible
Typhus	Lethal, Non-transmissible
Viral	
Influenza	Non-lethal, Transmissible
Smallpox	Lethal, Transmissible

Toxins

Staphylococcal enterotoxin (bacteria)	Non-lethal, Non-transmissible
Botulinum toxin (bacteria)	Lethal, Non-transmissible
Cobra neurotoxin (snake venom)	Lethal, Non-transmissible
Palytoxin (coral poisoning)	Lethal, Non-transmissible
Ricin (plant & seed poisoning)	Non-lethal, Non-transmissible
Tetrodotoxin (puffer fish)	Lethal, Non-transmissible

Figure 3

These agents, like bacteria, viruses and toxins, will change the face of battle

However, biological weapons, like nuclear weapons, are expensive. An effective biological warfare program requires hundreds of liters of agent. This entails special fermentation facilities for mass production and elaborate precautions in terms of sterility and personnel protection during manufacture and weaponization. These weapons also require specialized dispersal systems such as aircraft with spray tanks or heavy cruise missiles, spraying small amounts of agent to affect a very wide area.

Although biological weapons inflict diseases only on contact, their use and spread cannot be controlled as precisely as chemical weapons. Because biological weapons are adversely affected by temperature, humidity and sunlight, there is also a real danger that a country would use extreme amounts to gain the desired effect. The possibility exists that some nation could use a biological weapon that once delivered, would continue to spread infection through human contact -- in effect producing an epidemic.[8]

With all of these limiting factors on biological weapons, I believe the real threat from and within the third world is chemical weapons.

Chemical Weapons

The Iraq-Iran war provided the third world with a case study in how to organize chemical forces, in the kind of chemical agents required, in the need to solve targeting and weather prediction problems, and how to develop chemical weapons in binary form.

The basic technical literature relevant to effective military use of chemical weapons is readily available. The USSR provided such literature in the past as part of its technology transfer and training packages. Key U.S. Army field manuals on the subject drafted in the 1960's, are unclassified and easily obtainable.[9]

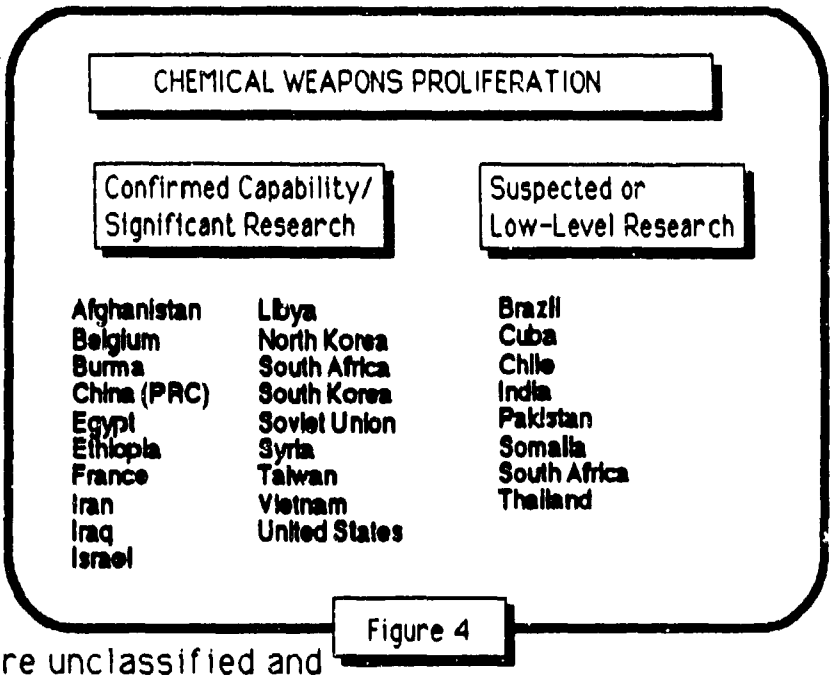


Figure 4

Proliferation of chemical weapons is at almost epidemic proportions (figure 4). "Modern" agents -- nerve and blister -- appear to be the easiest to obtain. In the recent past, technology for these weapons was acquired by developing nations from Western and Asian countries under the guise of building pesticide, insecticide or pharmaceutical plants. At least one developing country (Iraq) that bought this technology had (until Desert

Storm) an estimated capability of producing over 800 tons of nerve and blister agents a year.10

The "old" agents -- phosgene, hydrogen cyanide, chlorine, etc., are actually easier to obtain than "modern" agents because they now have commercial applications that make them readily available in tremendous quantities. For example, over 600 thousand tons of phosgene and hydrogen cyanide are produced annually in the United States for use in dyes, glass and plastics. And, the same chemicals used in laundry detergents are just two processing steps away from an extremely lethal "old" agent (chlorine gas).

The art and science of future chemical warfare will include weapons with increased selectivity (the ability to "tweak" the chemical agent so that it is either lethal or incapacitating), weapons that can penetrate current protective gear, weapons that are microencapsulated to improve storage and agent resistance problems, and discipline breakers (psychochemicals, incapacitants, etc.).

Given the proliferation of these conventional, nuclear, biological and chemical weapons throughout the developing world, is there a more threatening possibility for use of these weapons? Yes -- by terrorists.

Terrorists

It is merely a question of time before terrorists avail themselves of nuclear, biological or chemical weapons. With a small yield nuclear device, or small amounts of chemical or biological agents, terrorist groups can create havoc through fear and intimidation. These weapons are ideally suited for covert or terrorist delivery.

A typical scenario for a nuclear device involves stealing reactor material. When purified, Pu^{239}, (a nuclear reactor waste product) is the same material used in nuclear weapons. Transportation of the stolen material is easy. Skills available to larger terrorist groups (e.g., narco-terrorists) include an abundance of personnel proficient in covertly transporting material. Building a detonator is also easy. An increasing number of sophisticated improvised explosive device builders can be found in terrorist organizations. Today, terrorists have or will soon be able to build a device with a yield between .1 kiloton and 1 kiloton.[11] In the future, who knows.

Terrorists do not have to steal anything to acquire chemical and biological weapons. In many cases, all they have to do is purchase the right materials and assemble the final product at home. Any resourceful person with a college degree in chemistry or microbiology, and access to fairly common raw materials, can build lethal biological and chemical weapons.

For a biological weapon, all a terrorist has to do is obtain a toxin or disease culture from a medical supplier (extremely easy to do), grow it, make it into a powder and release it as an aerosol in the target area. For chemical agents, the process is even easier. After obtaining the raw materials from a local high school chemistry department or from a mail order supplier, simple kitchen pots and pans and a delivery device are all that is needed.[12]

As can be seen, in the near and long term, the United States will be faced by a multitude of NBC threats. Some threats are old, some are new. Some threats are simplistic but lethal, some are sophisticated and deadly. The common thread is that all these threats are real, now and in the future. Based on the threat alone there is a need for the Chemical Corps. One of the hard questions is -- how should the Chemical Corps (and in some cases the Army) be structured and equipped to meet the threat? I have some ideas and concepts.

Ideas and Concepts

My ideas and concepts are based on logic, reason and risk because I feel the Chemical Corps must use these human dimensions to meet the nuclear, biological and chemical threat from the Soviet Union, third world countries and terrorists. No one can predict with any certainty who or what will present the greatest threat at any given time. Circumstances and events that affect future direction change dramatically, particularly when politics and human emotions are involved. However, specific parts of these threats, circumstances and events can be quantified with logic and reason -- in fact, by using logic and reason they have a high probability of remaining constant. The other parts of these threats, circumstances and events must be looked at as a function of risk. These risks cannot be quantified, but they can be evaluated and applied as part of the decision making cycle.

The Operational Continuum

For the Army and the Chemical Corps, I think there is an NBC operational continuum. This continuum in many ways parallels that of airland battle or airland battle-future.

First, the Soviet Union. We must be operationally capable of fighting the Soviet Union. Emerging Soviet political thinking is manifested in the

concepts of "defensive doctrine" and "reasonable sufficiency." Emerging Soviet doctrine emphasizes the prevention of war over preparation for and conduct of offensive war.[13] Politics and doctrine aside, the Soviet Union is still the greatest NBC threat to the United States. This means being able to fight on an operational continuum that includes limited nuclear strikes or massive strategic nuclear strikes; from a "clean" battlefield to one contaminated with biological agents or includes sustained chemical attacks.

Second, we must be capable of fighting a war with or within the third world. Proliferation of third world NBC capabilities poses regional problems with global implications.[14] In the near term this means we must be able to fight a war that has relatively limited numbers of conventional (but high technology) weapons, could have limited low yield nuclear weapons, and could have limited first strike or harassing biological and chemical attacks. In the long term all these "limited" options have a high probability of becoming "large scale . . .".

Third, we must be capable of providing training, equipment and specialized forces for fighting an NBC war with terrorists. As terrorist organizations become more and more sophisticated, develop new resources and become increasingly more territorial, we must realize they could easily become the predominant threat of the future.

U.S. Army and Chemical Corps Missions

With these operational challenges the U.S. Army and the Chemical Corps must adapt force planning and strategy to the clear prospect that war will change radically over the next few decades. We must treat the proliferation of nuclear, biological and chemical weapons as a long term problem of cumulative risk. We must be able to respond all along the operational continuum, including in an NBC environment and we must take a long term approach toward negating the threat posed by these weapons.

To tackle these challenges the Chemical Corps must establish near term priorities and develop a long term vision for the future. While I will never profess to have all the answers, I think I have some ideas of what these priorities and vision should be. I have divided near term priorities and long term vision into three mission areas -- counter-force, NBC defense, and National Command Authority. These mission areas are not current doctrine, but I think they best describe how I see the roles and capabilities of the Chemical Corps. Counter-force missions provide a combat multiplier for offensive and defensive operations. Included are smoke and obscurants, flame, fuel-air explosives, binary munitions and "non-lethal" systems. NBC defense missions warn and protect -- intelligence, reconnaissance, detection, decontamination and protection. National

Command Authority missions are those that the President or Secretary of Defense direct the Army and Chemical Corps to do.

Near Term Priorities
&
Long Term Vision

Counter-Force

In the near term, the Chemical Corps must modernize its counter-force capabilities and doctrine. For the foreseeable future, United States forces may have to fight and win on linear and non-linear battlefields, from deserts to jungles to mountains, and in the heat and cold. Modern smoke and obscurant systems, better flame devices, low cost, small size fuel-air-explosives, binary munitions, and "non-lethal" weapons will enhance the Army's ability to operate on these diverse battlefields.

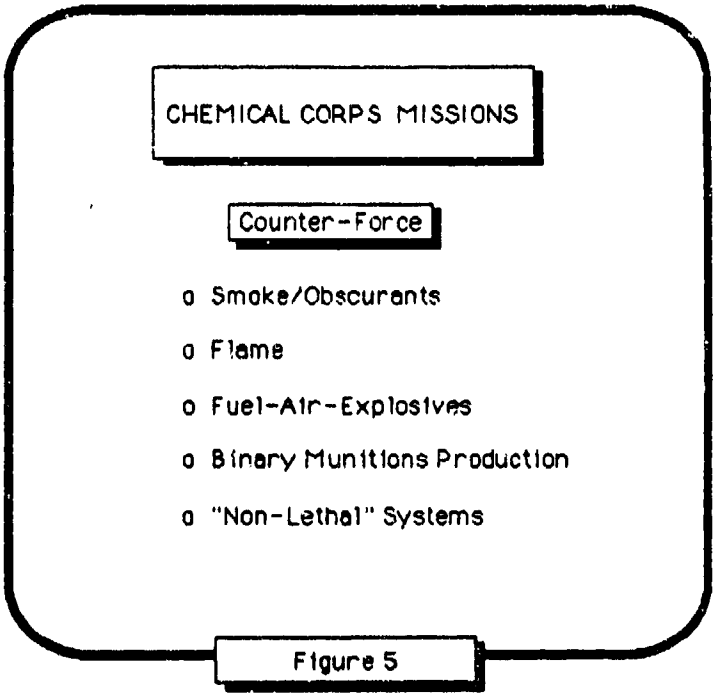


Figure 5

In the near and long term, efforts should be focused on fielding the newest smoke and obscurant systems for heavy and light forces to counter current visual and enhanced optical sighting systems. Research should

continue on obscurant systems that will defeat known and proposed sighting and sensing systems, and on projected smoke as an alternative to artillery delivered smoke. Such projected smoke would allow units to place smoke on or in front of the enemy, defeating threat sensors while having no effect on our own sensors.[15]

What do I mean by projected smoke? First, let's look at the current means for putting smoke on a target. The United States mainly employs smoke generators and artillery. There are other methods but none match the volume or duration of these two. Smoke generators can project smoke, however, wind direction, temperature, humidity, etc. (and time) must be right if the target for that smoke is a long distance away. Thus, the main means of delivering smoke is artillery. Current linear battlefield operational plans call for massive artillery fires in the close-in and deep battles to destroy the enemy and disrupt his optempo. Future non-linear battles will require concentrated and lethal artillery fires in multiple directions. Current and proposed logistics systems will have difficulty supplying the artillery with casualty producing projectiles, let alone smoke. Adding projected smoke as a mission for the Chemical Corps makes sense

Flame operations should be integrated into the operational mission of all company size combat arms units. The Chemical Corps Noncommissioned

Officer in these units should be responsible for training, equipping and directing the unit in this mission. Divisional and non-divisional chemical companies should provide area flame support for divisions and corps in the offense and defense. In support of this mission flame technology and research should be funded with the purpose of developing prepackaged flame devices. Development of these prepackaged devices could provide another combat multiplier for the tactical commander. In the future, extensive research should be conducted to develop low cost, small size, fuel-air-explosives as a replacement for flame weapons.

Binary munitions production was halted 1 June 1990, due to the United States - Soviet Union Bilateral Chemical Weapons Destruction Agreement. Longstanding United States policy to retaliate-in-kind should not be an idle threat. As a credible deterrent against third world proliferation, facilities for binary munitions must remain intact and ready to start-up production on a moment's notice.

As an adjunct to nuclear, biological and chemical weapons, the United States should move ahead with research and development on "non-lethal" weapons. Specifically this means chemical agents which change the molecular structure of base metals or alloys on critical aircraft, ships, tanks and trucks. Such weapons provide new dimensions for using the lowest level of force to defeat an enemy.[16]

Counter-force doctrine should be developed that addresses the full spectrum of these capabilities. For example, projected smoke, obscurants and flame weapons should be addressed doctrinally as interrelated parts of the offense and defense, not as separate and distinct parts. Each capability is a combat multiplier in its own right and when combined, provides even greater support for the ground commander. Additionally, doctrine for the offensive use of NBC weapons (chemical in particular) should not be a black art practiced by the Chemical Corps and the Field Artillery. Combat commanders must know the capabilities and limitations of these weapons if and when they are ever available for use.

NBC Defense

Responsibility for protecting United States forces from NBC weapons rests on our defensive capabilities. NBC defense missions must be re-evaluated in the near term and re-fined in the long term. Modern battlefield lethality (regardless if it means fighting the Soviet Union, a developing nation or a terrorist group) will require commanders to take calculated risks -- risks that mean

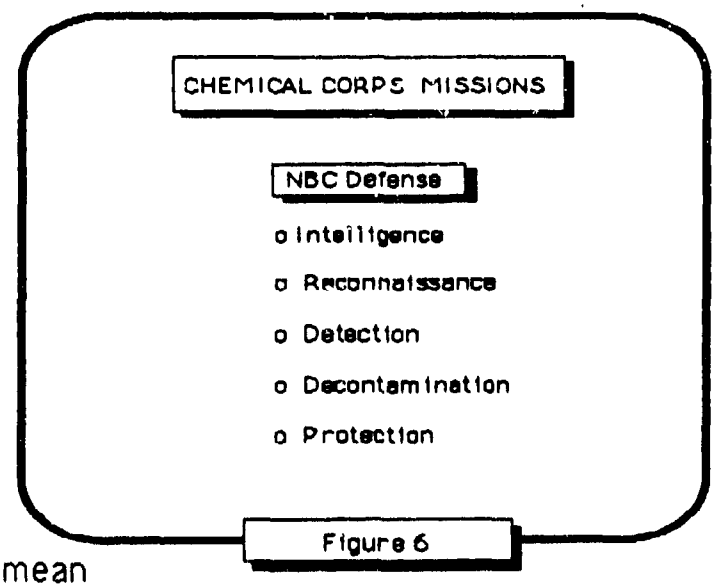


Figure 6

tradeoffs between levels of NBC protection and combat power -- risks that hinge on whether time will allow a contaminated area to be by-passed or requires it to be crossed -- risks that must consider whether decontamination can be delayed or is required immediately.

First, to provide commanders with the least amount of risk on the modern battlefield, more emphasis must be placed on NBC related strategic, operational and tactical intelligence, forward reconnaissance and close-in detection. Advanced warning is essential to the commander who must take calculated risks. NBC weapons have a signature that can be detected, if they are looked for. The Chemical Corps must infuse itself into the intelligence community. The Corps must insist and assist in strategic assessments of theaters of operations within every unified and specified command These assessments must be continually updated to reflect known or suspected NBC capable states, the national will of these states to use NBC weapons, their production capacities and delivery systems. At the operational level, locations of stockpiles, delivery systems and production facilities must be continually monitored. At the tactical level, the intelligence preparation of the battlefield (IPB) process and NBC essential elements of information must be refined to always reflect NBC weapons.

An integral part of the intelligence process is reconnaissance. The Chemical Corps must continue fielding the Fuchs NBC Reconnaissance

System (NBCRS). The NBCRS gives United States forces real time capability to detect and analyze any known chemical agent and detect radiological contamination while on the move. The NBCRS therefore gives United States forces their best means for preserving combat effectiveness by providing the best system for contamination avoidance. In the near term, development should start on a smaller, lighter version for light forces. In the long term, an add-on system should be developed that detects and analyzes biological agents. The Chemical Corps must also explore development of a far-forward, or in-depth, reconnaissance and NBC detection capability. These capabilities should augment on-going theater intelligence.

We need to develop single and multiple threat detection devices. For example, we currently have three chemical detection devices in the inventory, each with unique but interrelated capability. A single, man-portable device needs to be developed that can accomplish all three missions. The same holds true for radiological detection devices. In the near term, we need to develop a field biological detection device that can be operated by soldiers. If the technology is available, a single NBC detection device must be developed. Initially, it could be vehicular mounted until development of a man-portable version. As with the current detection systems, this device would be a unit item operated by any member of that unit.

In the near term, we need to focus on alternatives to full encapsulation (as a means of personnel protection) and the requirement for complete decontamination of equipment (for NBC hazards). The "wear Mission Oriented Protective Posture (MOPP) or die" philosophy must be changed. The "hasty decontamination only delays the inevitable complete decontamination" paradigm must be broken. Why? Because, as noted above, success in battle means taking risks, and risk taking requires hard decisions, including - how many casualties am I willing to accept? Is combat power more important than losing soldiers to NBC contamination?

With regard to full encapsulation or MOPP 4, a simple equation states MOPP 4 = 50% reduction in combat capability (untrained forces). Obviously, it is reasonable to want a much lower reduction in combat capability if at all possible. I believe there are several ways to accomplish that.

First, we need a light weight protection system that provides one to two hours protection so personnel can get out of a contaminated area. In the near term, only a limited number of countries can project and sustain large scale NBC attacks. We have MOPP to protect ourselves in such cases. But most of the developing world cannot project and sustain NBC warfare across and through the depth of the battlefield, even in regional conflicts. Therefore, it is reasonable to assume that the contaminated area a contaminated unit is in would not exceed the distance the unit could move

in two hours. I believe this would hold true for meeting engagements or movement to contact because of the swiftness of modern battle. Once out of a contaminated area, the light weight protection system could be discarded.

As part of this effort, and as an interim solution, we need to investigate the protection afforded by current "rucksack" items. If protection, at a calculated level of risk, can be achieved by wearing or using "rucksack" items, should not commanders take that risk (with the advice of their Chemical Officer)?

Regarding decontamination, we must develop a system that is highly mobile, quick, lowers MOPP to protective mask, gloves and over-boots, and conserves water. Again, the face of battle says that conflict will be short and lethal. Therefore, the key element of combat power, if NBC weapons are used, is time. Decontamination units must be able to reach a contaminated unit quickly, complete a partial decontamination while the unit is on the move, lower the MOPP and carry enough water or decontaminants so that the decontamination unit is not terrain dependent.

Related to the protection and decontamination issue, simple rationale says if the possibility of NBC use is low, commanders will elect to take ammunition rather than MOPP gear or decontaminants. For combat arms commanders, it is a very calculated risk. But what happens when the "low"

becomes "high" after joining the battle? Several divisions have a home-grown solution for this dilemma. They have palletization systems for MOPP gear and decontaminants integrated into the deployment system. These systems are specifically set up for low threat, no threat scenarios. The only thing lacking is a protection and decontamination system to fill the gap until MOPP gear and decontaminants are brought forward.

Finally, we must upgrade the number of vehicles with collective protection systems. We must field more tactical operations center collective protection systems. When all else fails, and war pushes the performance envelope in duration and lethality, our fighting systems and command and control systems must be capable of carrying on.

To support these force modernization and doctrinal changes, will require restructuring the Chemical Corps. For example, unified commands, specified commands, corps and division chemical sections must have an NBC intelligence cell of at least two personnel. This cell would work with the intelligence analysts of the all-source information center. The cell's mission would be assessment and analysis of enemy NBC activity.

The division chemical company needs to be restructured to tri-purpose -- smoke, decontamination and reconnaissance. The non-linear battlefield of the future shows a clear requirement for all three capabilities at the lowest level possible. In the near term, each chemical company should have

platoons with mobile smoke and lightweight decontamination systems, and a separate reconnaissance platoon. In the long term, as technology becomes more refined, each platoon should have all three capabilities integrated into one system. Corps need to have two companies -- one tri-purpose and one decontamination (for reconstitution and reorganization). In the near term, the decontamination company should parallel our current corps company. In the future, new decontamination devices and techniques should be developed to make the company more responsive. Finally, the field army will require four companies -- two tri-purpose and two decontamination.

National Command Authority

The Army has several National Command Authority missions. In the near term, they include demilitarization of our chemical weapons stockpile and chemical weapons stockpile maintenance. Now and in the future, there will be requirements for on-site inspection in support of NBC agreements and conventions. All these missions will continue well into the 21st century and the Chemical Corps is and will be an active participant in them.

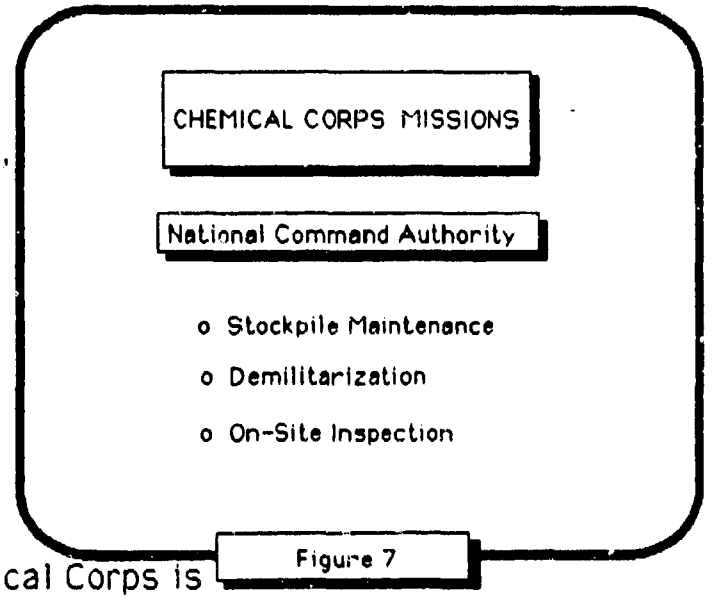


Figure 7

All of these National Command Authority missions are time and manpower intensive and each mission in its own way is a "zero defects" operation. The Chemical Corps must insure that it trains a quality force of experts, officer and enlisted, to work in these sensitive areas.

Conclusion

In conclusion, the Chemical Corps is now, and will be, a valuable asset to the Army of the future. The possibility of NBC warfare has not gone away - it has only changed location. Regardless of how you paint the picture of the battlefield, the Army must be prepared for the use of NBC weapons. The old sports axiom -- "the best defense is a good offense" -- does not strictly apply with weapons of mass destruction. What was a good offense yesterday may be overcome by technology tomorrow. The Army and the Chemical Corps must aggressively pursue NBC defense tactics, techniques and procedures well into the 21st century. The Chemical Corps must provide the Army the ways and means for NBC reconnaissance, detection, protection and decontamination. In other words, to maintain the best offensive force, we must have a good NBC defensive force.

Even if weapons of mass destruction are eliminated from all the arsenals of the world, the Chemical Corps is not and will not be a single

purpose branch of service. Into the foreseeable future, the Chemical Corps has other valuable services to provide the Army, particularly in counter-force operations. As noted earlier, smoke and obscurant systems, flame devices, fuel-air-explosives and "non-lethal" weapons are near term and long term areas of interest for the Chemical Corps. Through the use of counter-force systems, the Chemical Corps will be able to respond on the "clean" and dirty" battlefield with combat multipliers that make a difference. I see these counter-force missions and systems in a complimentary role to the traditional NBC defense mission.

Thus, I think the Chemical Corps should not face the future as a single mission, single role branch of the Army. My ideas and concepts for the Chemical Corps requires officers, noncommissioned officers and soldiers with multiple skills that can be applied across the operational continuum. My ideas and concepts for the Chemical Corps require taking the lead in technology -- developing multi-purpose units, systems and equipment to counter conventional threats and defend against NBC threats. My ideas and concepts for the Chemical Corps, with the right decisions and vision, can assist keeping the Chemical Corps strong and vital.

ENDNOTES

1. Various sources, but primarily, John S. McCain III, "Proliferation in the 1990s. Implications for U.S. Policy and Force Planning," Strategic Review, Summer, 1989, p. 11.

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3. Ibid., p. 10.

4. Ibid., p. 11.

5. John Hemsley, The Soviet Biochemical Threat to NATO, St. Martin's Press: New York, 1987, p. 123.

6. Gina Kolata, "The Magic in Magic Bullets," Science, 21 October 1983, pp. 310-312.

7. Ibid., p. 298.

8. McCain III, p. 14.

9. Ibid., p. 13.

10. Michael Ledeen, "The Curious Case of Chemical Warfare," Commentary, Volume 88, Number One, July 1989, p. 38.

11. Captain Fritz J. Barth, USMC, "Stemming Nuclear Terrorism," Proceedings, U.S. Naval Institute, December 1989, p. 57.

12. Patrick G. Marshall, "Obstacles to Bio-Chemical Disarmament," Congressional Quarterly's Editorial Research Report, Volume 1, Number 24, 29 June 1990, pp. 372-373.

13. United States Department of the Army, The Army Plan FY 1992-2007 (U), February 1990, pp. 5-11, SECRET.

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